

Lutronic's New SPECTRA Treats Multiple Indications in One System

By Kevin A. Wilson, Contributing Editor

The latest version of the SPECTRA series laser platform from Lutronic Corporation (Ilsan, Korea), is clinically proven to treat a wide variety of conditions from melasma to skin rejuvenation. Respected by thousands of satisfied clinicians worldwide, this new modality combines essential aesthetic wavelengths in one device, providing outstanding versatility for aesthetic physicians throughout Asia.

**SPECTRA is pending FDA approval in the U.S.*



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“This device targets the most common problems of Asian skin, including pigment, melasma, skin tone and post-inflammatory hyperpigmentation with reliable results, and it is backed by many Asian clinical studies.”

According to Il-Hwan Kim, M.D., professor of dermatology at Korea University Ansan Hospital (Gyeonggi-Do, Korea), acne vulgaris and associated scarring, skin rejuvenation and the various types of acquired or iatrogenic pigmentation are common indications seen in the aesthetic laser surgeon’s clinic. “SPECTRA allows users to treat all these and more,” he noted.



Il-Hwan Kim, M.D.
Professor of Dermatology
Korea University Ansan Hospital
Gyeonggi-Do, Korea



Before Tx

After SPECTRA Tx

Photos courtesy of Tina Pai, M.D.

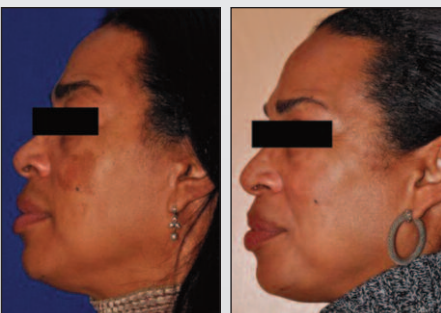


Ka Keung Ho, M.D.
Dermatologist
Hong Kong, China

SPECTRA offers various scientifically proven and easily selectable treatment modes, even for successful treatment of melasma in Asian skin – a typically difficult-to-treat condition. Ka Keung Ho, M.D., a dermatologist in Hong Kong, China, is impressed with the SPECTRA’s versatility. “This device targets the most common problems of Asian skin, including pigment, melasma, skin tone and post-inflammatory hyperpigmentation (PIH) with reliable results, and it is backed by many Asian clinical studies. Furthermore, it is especially useful for freckles, melasma, pore size and tattoos.”

Essentially, SPECTRA is an Nd:YAG based system, operating at 1064 nm with frequency doubling for 532 nm capability. However, it also features two optional handpieces: 585 nm and 650 nm solid dye lasers – pumped by the 532 nm wavelength – which are used mostly for tattoo removal, further increasing the platform’s versatility.

“With SPECTRA’s 1064 nm laser there are two pulse modes: a true Q-switched mode with a 5 ns pulse, as well as a quasi-long pulsed mode delivering a 300 μ s pulse – each with distinct tissue interactions,” Dr. I.H. Kim explained. “The 1064 nm wavelength is associated with pigment removal, especially in the Q-switched mode. Of course in both modes, 1064 nm can be used with a photoenhancer to further alter and control the tissue reaction, thus making science work for us, instead of allowing the wavelength to control what we can do. It’s like having two different lasers – or three if you count the 532 nm option.”



Before Tx

After SPECTRA Tx

Photos courtesy of Tina Pai, M.D.

SPECTRA users can easily shift between the Q-switched and quasi-long pulsed modes for specific cellular, subcellular or tissue targets, with or without an easily-applied photoenhancer. Physicians may also switch quickly to and from the 532 nm visible green beam for specific pigmented lesions and some tattoo pigments. Easily interchangeable handpieces, as well as fixed focus and zoom, give a range of spot sizes for both precision and convenience. “The variable repetition rate allows less experienced users to become familiar with the technique of moving the handpiece dynamically across large areas of skin without causing too much overlap,” Dr. I.H. Kim advised, “but it also allows experienced users to move much faster, thus decreasing the time it takes to perform full-face skin rejuvenation or acne / acne scar treatments, for example.”

Featuring a true ‘flat top’ or ‘top hat’ beam profile, SPECTRA delivers homogeneous incident power density over the entire treatment area per irradiated spot. “This constant, predictable energy output is ideal for Asian skin types,” Dr. Ho said. “It helps reduce the likelihood of the patient developing PIH.”

"I have performed SPECTRA treatments in more than ten cases per day for approximately eight years, and I have never had to call in the service engineer. Not even to fix an electrical malfunction."

There are some simpler practical advantages to SPECTRA as well, Dr. I.H. Kim explained. In addition to being relatively affordable, the device is low maintenance and does not have associated consumables. The design of the unit itself is beneficial to the practice in other ways. "The SPECTRA is ergonomically designed," he said, "so it is easy to set up, use and keep clean. It is also easy to move between treatment rooms because it is on wheels." The platform features an easy-to-use intuitive graphic user interface that recognizes handpieces and selected spot size, with automatic resetting of parameters. In addition, favorite or preferred treatment settings can also be saved to memory for rapid recall.

Although users can tailor treatments based on their experience with the different laser modes and handpieces, recommended SPECTRA 1064 nm treatment regimens fall into one of four categories: Laser Toning, Soft Peel, SPECTRA mode, and combinations such as SPECTRA Peel, which join SPECTRA mode and Soft Peel.

Jie-Hoon Kim, M.D., professor of dermatology at Ajou University School of Medicine and Institute of Medical Sciences (Suwon, Korea), believes that SPECTRA's solidity, dependability and superior beam quality are its strongest advantages. "In order to perform carbon peeling and Laser Toning, more than 1,000 shots per session are needed," Dr. J.H. Kim pointed out. "I have performed SPECTRA treatments in more than ten cases per day for approximately eight years, and I have never had to call in the service engineer. Not even to fix an electrical malfunction."



Jie-Hoon Kim, M.D.
Professor of Dermatology
Ajou University School of Medicine and
Institute of Medical Sciences
Suwon, Korea

"Furthermore, the system's unique top hat beam profile and superior beam quality are essential," Dr. J.H. Kim continued. "If the beam quality was unstable and a Gaussian beam profile was delivered, the treatment results might be uneven. Mottled pigmentation could develop with permanent hypopigmentation."



Yen-Yu Chao, M.D.
Dermatologic Surgeon
Taipei, Taiwan

"Compared to other laser devices," said Yen-Yu Chao, M.D., a dermatologic surgeon in Taipei, Taiwan, "the SPECTRA beam profile allows the energy to be applied evenly over the treatment spot so there is no bleeding. This is important for treating pigmented lesions, which is what I primarily use this device for."

As Tina Pai, M.D., a dermatologist at Skin Spectrum (Tucson, Arizona, U.S.), further explained, Asian skin has a tendency to hyperpigment or hypopigment, which has made it a less than ideal candidate for many lasers in the past. "SPECTRA is especially valuable in treating pigmented conditions in Asian skin, allowing me to perform treatments that I have been unable to do in the past, such as laser treatment of melasma."



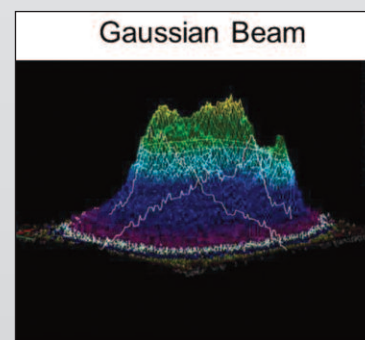
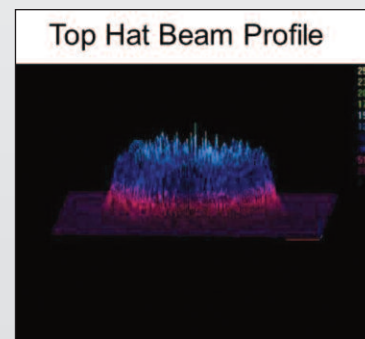
Tina Pai, M.D.
Dermatologist
Skin Spectrum
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Dr. J.H. Kim also emphasized that SPECTRA's ability to treat dermal and epidermal forms of melasma, especially in Asian skin, is of particular interest. "Many current protocols for

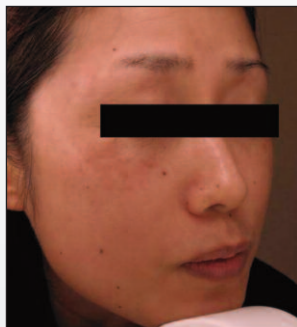


Before Tx After SPECTRA Tx

Photos courtesy of Tina Pai, M.D.



“Treatment is fairly comfortable. This is often overlooked by physicians, but it is a major consideration for patients, who may not obtain the best results if they fail to complete the treatment program.”

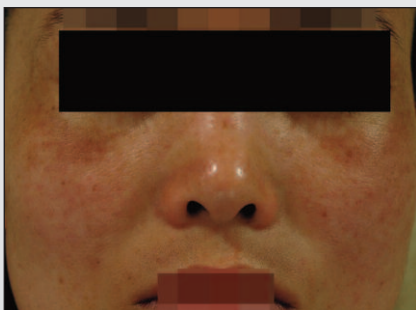


Before Tx

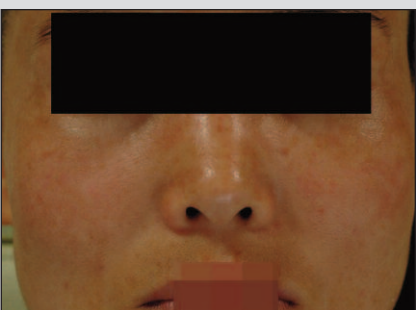


After ten Laser Toning treatments

Photos courtesy of Miki Moroi, M.D.



42 year old Korean female with melasma and freckles



42 year old Korean female after three Laser Toning treatments

Photos courtesy of Jie-Hoon Kim, M.D.

melasma work well in the lighter skin types, such as those using intense pulsed light (IPL).” Conversely, these methods may actually exacerbate the pigmentation in Asian type IV skin, which is a real problem since melasma is very common in Asian women over age 35.

One thing Dr. J.H. Kim stressed, is that he never uses the SPECTRA mode for melasma, since the pure heating effect will almost certainly leave patients with more pigmentation than before due to stimulation of melanocytes that are already hyperactive. “However, a combination of Soft Peel, followed by Laser Toning, has achieved excellent, consistent and reproducible results in my melasma patients. I work in staged anatomical layers, from superficial to deeper, combining the peeling effects of the Soft Peel with the subcellular selective photothermolysis of the Laser Toning,” he advised.

“In addition,” Dr. J.H. Kim continued, “by removing the most disorganized strata of the stratum corneum, Soft Peel has created a kind of epidermal window to allow better penetration of the 1064 nm energy during the laser toning segment. We must always remember that normal skin reflects a fair amount of energy at 1064 nm, around 18%, so removing the most disorganized optical elements will increase penetration.”

According to Behrooz Barikbin, M.D., assistant professor of dermatology at Shahid Beheshti University of Medical Sciences, Shohada-e Tajrish Hospital (Tehran, Iran), women in Iran experience similar melasma issues as Asian women. “SPECTRA’s efficacy against melasma in darker skin types is especially advantageous. Its ability to treat tattoos, which are also prevalent among Iranian women, is of additional benefit. Also, treatment is fairly comfortable. This is often overlooked by physicians, but it is a major consideration for patients, who may not obtain the best results if they fail to complete the treatment program.”

Relying solely on SPECTRA’s Q-switched mode, Laser Toning is ideal for pigmentary disorders including Nevus of Ota, Hori’s Nevus and post-inflammatory or secondary hyperpigmentation, and is especially effective in melasma. It can also be used for very mild acne scars. For Laser Toning, the 5 ns pulse width Q-switched mode is utilized at an approximate 2 J/cm² fluence. Laser energy is applied to previously cleansed skin without any photoenhancer at a repetition rate of two to five, for three or four passes with approximately 30% to 50% overlap, delivering the equivalent of two passes per single pass. After treatment a cool pack or mask is immediately applied. Depending on the pigment density and depth, several treatment sessions may be required at two week intervals.

Although wavelengths with the highest absorption coefficient in melanin are located in the shorter wavelength visible waveband, melanin still absorbs 1064 nm light better than surrounding normal tissues. “This is especially true in higher pigment densities such as nevus zygomaticus and Nevus of Ota, offering a chromophore-based selectivity under special circumstances,” Dr. Chao conveyed.

With melasma (pigmentation caused by overactive dendritic epidermal basal layer melanocytes), melanin nests may be present in the epidermis, the dermis or a combination of the two. The primary target within the melanocyte is the melanosomes, discrete particles which are synthesized by the melanocyte, according to Dr. I.H. Kim.

“As melanosomes are transported along the melanocyte dendrites they undergo oxidation and turn progressively darker until they reach the end of the dendrite, where they fragment and are passed into ascending daughter keratinocytes forming a protective cap

“In the case of Laser Toning, an extremely interesting phenomenon has been noted whereby oxidized melanosomes within living melanocytes are targeted by the beam and selectively destroyed.”

of dark brown or black melanin granules over the nucleus,” he explained. “In patients with epidermal melasma, these granules are larger and more numerous. For the dermal component, macrophage-type cells ingest melanin granules and migrate down into the papillary dermis, where they may form nests of melanin-containing cells. Many patients present with both dermal and epidermal forms, making melasma a compound lesion.”

“Treatment with SPECTRA’s Laser Toning regimen relies on a concept that has been called subcellular selective photothermolysis, based on the original concept of selective photothermolysis first published by R. Rox Anderson, M.D.,” Dr. I.H. Kim reported. The high peak power (incident irradiance of approximately 400 mW/cm²) delivered in the ultrashort pulse width of the Q-switched mode creates an almost instantaneous and pure radiant heat effect specific to the melanin absorbing the laser energy, excluding the surrounding tissue components. Since the thermal relaxation time is limited to a few nanoseconds, very little heat is allowed to escape to surrounding tissues, instead concentrated towards destruction of the target chromophore into microparticles, which the body eliminates naturally.

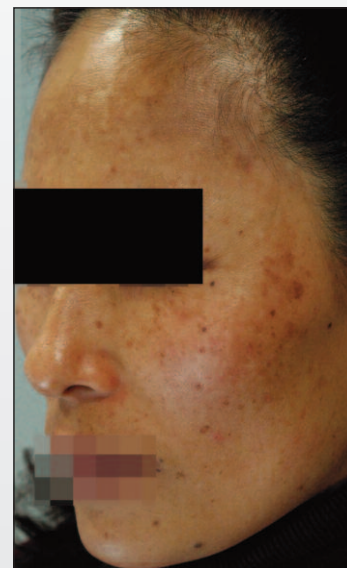
“In the case of Laser Toning, an extremely interesting phenomenon has been noted whereby oxidized melanosomes within living melanocytes are targeted by the beam and selectively destroyed, leaving the melanocyte somewhat shrunken but still alive and functioning, albeit less actively than before. This is extremely important for selective removal of pigment without immediate or delayed hypopigmentation¹,” advised Dr. J.H. Kim. Epidermal melasma responds very quickly to Laser Toning, requiring only one or two sessions. For the compound and dermal types of melasma, more sessions are needed in staged pigment removal to prevent excessive damage to the surrounding normal tissues.

Un-Cheol Yeo, M.D., Ph.D., a dermatologist with the S & U Skin Clinic (Seoul, Korea), performs Laser Toning using the following treatment protocol: 1064 nm, 7 mm spot, collimated beam, 1.5 to 2.0 J/cm², 5 Hz and two passes, with a treatment end point of mild erythema. “With weekly treatments I see results after three or four treatments, with best improvement after eight to ten sessions. Monthly maintenance may be required,” he advised. “When using fluences below 2.5 J/cm², the incidence of hypopigmentation is far below 20%. The hypopigmented spot develops gradually, so with careful observation we can stop the treatment course when we first notice the hypopigmented macule. When halted at the initial stage there is some opportunity for spontaneous recovery.”

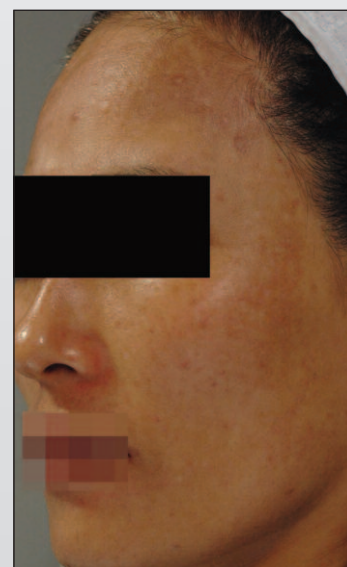


Un-Cheol Yeo, M.D., Ph.D.
Dermatologist
S & U Skin Clinic
Seoul, Korea

Treatments with the Soft Peel regimen employ the Q-switched mode at a fluence of approximately 2 J/cm² in combination with a photoenhancer (paraffin-oil based carbon lotion with uniform 40 µm carbon particles). The photoenhancer is applied in small areas and left to spread uniformly, creating a thin film over the treatment area and moving into pores and hair follicles. After excess lotion is wiped away, the laser energy is applied via a 7 mm spot, collimated handpiece with a maximum of 50% overlap, providing the equivalent of two passes in a single pass. As energy is applied, the carbon particles in the photoenhancer lotion explode with a popping or cracking sound (some form of plume extraction is recommended). Two to four passes are performed until the popping sounds subside, which means the carbon has been entirely vaporized. A cool pack or mask is applied immediately afterward. Additional



52 year old Korean female with melasma and senile lentigines



52 year old Korean female after five Laser Toning treatments

Photos courtesy of Jie-Hoon Kim, M.D.

Most frequently used for the treatment of mild-to-severe active acne lesions and associated skin problems, SPECTRA Peel comprises a combination of the Soft Peel and SPECTRA mode techniques.

treatment sessions may be necessary at two to three weeks. This therapy may also be applied to the treatment of enlarged pores or acne scarring.

“Carbon offers the highest absorption coefficient for 1064 nm near-infrared light,” Dr. Yeo explained. “As the carbon particles explode, a thin layer of the stratum corneum is removed, providing a sort of mild exfoliative peel.” This violent reaction delivers both a photoacoustic and photo-osmotic effect into the dermis through the epidermis, which reportedly enhances the therapeutic effect through a beneficial photo-mechanical stimulative reaction in the skin cells.²

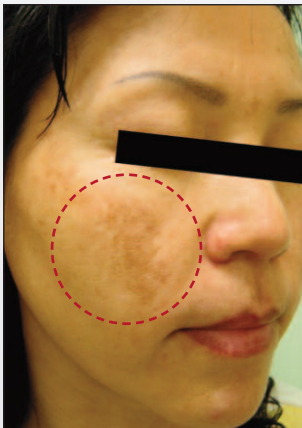
In SPECTRA mode the quasi-long pulsed 300 μ s mode is utilized, with a fluence of approximately 2 J/cm². The 7 mm collimated handpiece is recommended, and treatment is delivered in a single pass, with minimal overlap to prevent excessive heat build-up. Typically, this regimen is only used as part of a combination technique for the treatment of active acne lesions, followed by a Soft Peel as described above. Importantly, Dr. Yeo reiterated that SPECTRA mode must never be used for the treatment of melasma, as heat may exacerbate pigmentation and make lesions darker.

As with the SPECTRA Peel regimen, SPECTRA mode employs a carbon particle photoenhancer. Though, unlike the 5 ns Q-switched mode, the free running, quasi-long pulse of 300 μ s merely heats up the carbon particles without destroying them, thus mildly damaging the stratum corneum in contact with the photoenhancer layer. Heat is conducted down to the skin from the heated carbon (including those particles which have penetrated hair follicles and pores). Additional, mild heating of the dermal matrix occurs as a secondary thermal effect.

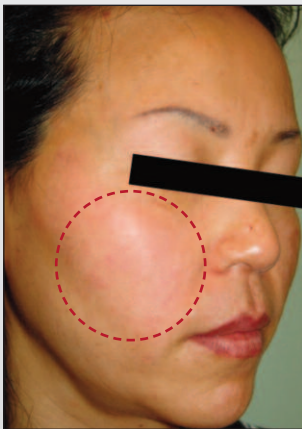
Alteration of the structure of affected sebaceous glands occurs as well, encouraging the destruction of *P. acnes* by thermally activated scavenger cells. Although this technique does not cause collateral damage to surrounding tissue, mild thermal activation is known to enhance neocollagenesis and activate epidermal keratinocytes to release cytokines which may enhance the healing process.

Most frequently used for the treatment of mild-to-severe active acne lesions and associated skin problems, SPECTRA Peel comprises a combination of the Soft Peel and SPECTRA mode techniques. Following application of the photoenhancer, the SPECTRA mode is applied first (7 mm collimated handpiece, approximately 2 J/cm², up to 2.5 J/cm², the higher the fluence that the patient can tolerate, the better the result) in a single pass, with as little overlapping as possible. Care should be taken to not miss too much target tissue. This is immediately followed by the Soft Peel approach (7 mm collimated handpiece, same fluence settings as SPECTRA mode, maximum of 2.5 J/cm²) with 50% beam overlap, two to four passes until popping sounds have subsided, indicating that all of the carbon particles have been targeted by the Q-switched 1064 nm beam.

While multiple passes should be performed, beams should not be stacked one onto the other in order to prevent excessive heat deposition. The immediate post treatment endpoint is an even erythema over the entire treated area. Apply a cooling pack or mask after treatment. The pure non-ablative heating effect of the SPECTRA mode causes mild damage to the stratum corneum, in addition to achieving controlled thermal stimulation of the epidermal basal layer keratinocytes and dermal skin cells. However, it also leaves the heated carbon particles in place on the stratum corneum. When this is followed by the Soft Peel regimen, the powerful explosive reaction between the laser



Melasma before Tx



Melasma after eight Laser Toning treatments

Photos courtesy of Il Hwan Kim, M.D.

“Patients often notice improvement in texture and tone after a single treatment, and love that there is minimal or no lingering signs of treatment, so they can go right back to work.”

energy and the carbon particles removes the already mildly damaged layer of the epidermis, providing a controlled mild epidermal exfoliative peel.

Mark G. Rubin, M.D., of the Lasky Skin Center in Beverly Hills, California, U.S., is performing a clinical trial of SPECTRA for enlarged pores with a protocol similar to that of SPECTRA Peel. After the carbon photoenhancer is applied, a pass is made with the SPECTRA mode, followed by a few passes with the Q-switched mode to disintegrate the carbon particles. Two to three final passes are made over areas of large pore concentration, with redness serving as a treatment endpoint. More than 35% pore reduction, on average, was observed after two to three treatments. “One advantage of this technique,” he said, “is that it works independently of skin type because the carbon is the chromophore, so very little heat travels to the skin or deeper. Instead the energy is concentrated where it will have the most effect.”



Mark G. Rubin, M.D.
Lasky Skin Center
Beverly Hills, CA, USA

Although the protocol called for three treatments, two or three weeks apart, Dr. Rubin found that two treatments were generally sufficient. The initial trial was performed on ten Caucasian patients but has been expanded. “Not only are we increasing the number of patients, we are adding a comparison to what may be considered the gold standard of pore reduction – IPL. Results compared to those of an established device will be more meaningful.”

Dr. Yeo uses SPECTRA Peel to treat acne. “The combination of the two modes offered through this approach apparently encourages destruction of active *P. acnes* in the sebaceous glands, without destroying the glands themselves,” he said. “It also encourages good wound healing, including a strong anti-inflammatory response to give long lasting results.” Dr. Yeo uses the 1064 nm at 0.3 ms and 5 ns, with 0.3 ms pulse duration. “The carbon particle transfers heat to the surrounding tissue – in this case the follicular infundibulum and superficial epidermis – so we can expect general heating in the upper follicular structure and normalization of pathologic conditions there. After that, a second pass with the 5 ns pulse (Q-switched mode) explodes the carbon particles to directly damage abnormal follicular infundibulum, which we believe also kills *P. acnes*.” Retreatment can be safely applied in the case of recurrence.

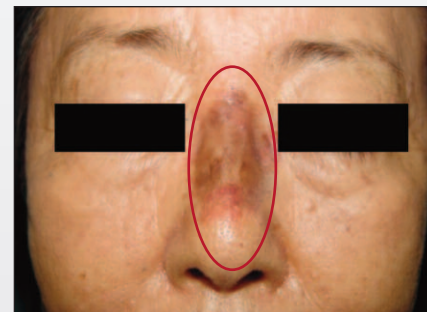
In Dr. Pai’s practice, patients love non-ablative rejuvenation with the SPECTRA Peel. “They often notice improvement in texture and tone after a single treatment, and love that there is minimal or no lingering signs of treatment, so they can go right back to work.”



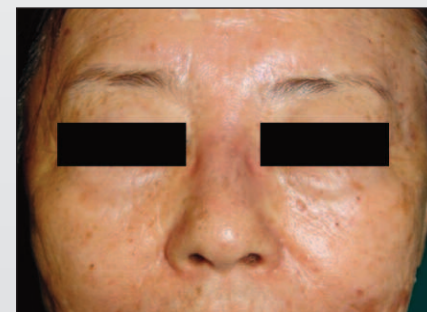
Miki Moroi, M.D.
Professor of Dermatology
Kyushu University
Fukuoka, Japan

Miki Moroi, M.D., a professor of dermatology at Kyushu University (Fukuoka, Japan) uses SPECTRA mostly for a large range of pigmented lesions, skin rejuvenation and acne. “The aging population in Japan poses some unique problems such as the complication of melasma with senile lentigines,” she advised.

“Formerly we used lasers for this, but we always observed PIH. Now we can use the Laser Toning and quasi-long pulse SPECTRA modes to consistently and efficiently treat these problematic lesions, and we can even treat PIH itself.”



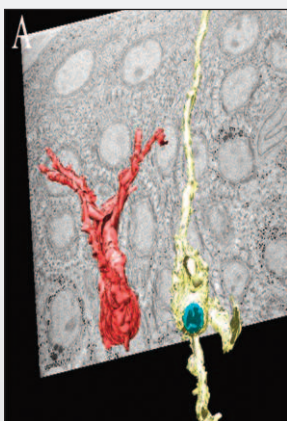
Post-inflammatory hyperpigmentation before Tx



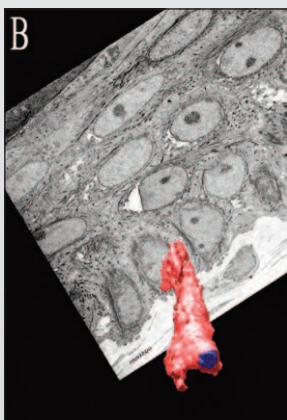
Post-inflammatory hyperpigmentation after eight Laser Toning treatments
Photos courtesy of Il Hwan Kim, M.D.

“The protocols for Lutronic devices have been worked out by Asians for Asian patients specifically.”

3D structures of melanocytes in epidermic layer of melasma patients



A: Melasma before Laser Toning Tx
Melanocytes in melasma patients have many dendrites and stretch



B: Melasma after Laser Toning Tx
3D structure of melanocytes contained fewer dendrites after Laser Toning Tx

Photos courtesy of Il Hwan Kim, M.D.³

For skin rejuvenation and active acne, Dr. Moroi uses the SPECTRA mode plus the 1064 nm Q-switched mode without carbon lotion. “My patients appreciate both the convenience of being able to have this combination treatment in a single session, and the excellent results. However, the greatest merit of SPECTRA is the wide-range of conditions I can treat with this single laser device coupled with the system’s reliability.”

Dr. I.H. Kim pointed out that, “Although users of the device will rely mostly on the 1064 nm laser modes for treatment, the 532 nm energy is particularly useful for epidermal pigmented lesions such as freckles, lentigines, Seborrheic Keratosis, and some tattoo pigments. In addition, there are optional solid dye handpieces pumped by the 532 nm beam to give yellow and red light for specific tattoo pigments.

“The main benefit of the different options is the ability to combine the various modes and wavelengths to achieve a synergistic whole that is greater than the sum of the individual components,” Dr. I.H. Kim stated. “For example, the 532 nm beam is excellent for the epidermal pigment components, while the 1064 Q-switched beam is great for the deeper dermal components in compound nevi. This means that we can approach these difficult-to-treat lesions in a staged manner, taking advantage of the way the Q-switched beam spares overlying epidermal tissues while selectively targeting the deeper pigment nests.” Performing Laser Toning a few days after other laser treatments, such as fractional ablative and non-ablative treatments has shown excellent synergy and delivered improved results as well.



Hang-Rae Cho, M.D., Ph.D.
Ohkims Dermatologic Clinic
Goyang, Korea

Hang-Rae Cho, M.D., Ph.D., of Ohkims Dermatologic Clinic (Goyang, Korea) uses the frequency doubled mode for mottled, pigmented sun damaged skin, or freckles. “Typically I use a conventional (spot by spot) technique with the 532 nm in Q-switched mode; sometimes I use a free running technique with the 7 mm spot size for tiny, crowded pigmented lesions. After that I apply the Laser Toning technique, free running, with the 7 mm spot, 1.2 J/cm², 4,000 shots for five to ten sessions, every other week.”

Dr. J.H. Kim feels that the technology behind a device is more important than the device itself. “I was impressed with Lutronic’s commitment to providing top quality service, software and other support and not just selling devices. They also continuously improve their devices and the methodology behind their use with strong science,” he emphasized. “So many laser devices developed in Europe and the U.S. offer treatment parameters set up for lighter skin types, compared to the range of skin types commonly seen among the Asian population. The protocols for Lutronic devices have been worked out by Asians for Asian patients specifically.” ■

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